REMARKS

In the Office Action, the Examiner objected to the drawings for failing to show the signal trace. Figure 1 has been amended to include the signal trace. A replacement sheet of drawings is enclosed. As noted in the specification (paragraph 21), the conductor 44 of Figure 2 may also represent the signal trace. The specification has also been amended to add the reference numeral 19 for the signal trace. No new matter has been added.

The Examiner rejected claim 2 pursuant to 35 U.S.C. § 112, second paragraph, as being indefinite due to "a signal trace connected with the electrode." A signal trace is known to a person of ordinary skill in the semiconductor or the capacitive membrane ultrasound transducer arts. A signal trace is a conductor, such as a deposited conductor, for interconnecting circuit components. Paragraph 21 of the specification clearly uses the term signal trace in this appropriate and known context.

Applicants respectfully request reconsideration of the rejections of claims 1-21, including independent claims 1, 12 and 20. Claims 1, 3, 4, 7, 12-15 and 20 were rejected pursuant to 35 U.S.C. § 102(b) as being anticipated by Radziemski et al. (U.S. Patent No. 6,737,789). Radziemski et al. is a 102(e) reference, not 102(b). Claim 2 was rejected pursuant to 35 U.S.C. § 103(a) as being upatentable over Radziemski et al. in view of Dvorsky (U.S. Patent No. 2,702,318).

Independent claim 1 recites a flexible membrane adjacent a void. For capacitive membrane ultrasound transducers, the flexible membrane adjacent a void and the associated conductor connected with the membrane transduce between acoustic and electrical energies. Radziemski et al. and Dvorsky do not disclose a flexible membrane adjacent a void with an associated conductor.

Radziemski et al. disclose a different kind of transducer, not a capacitive membrane ultrasound transducer. In particular, Radziemski et al. use piezoelectric elements for transduction (abstract; col. 2, lines 63-67; and col. 3, lines 66-67). A piezoelectric is a material which generates electric charge when subjected to an applied force that produces stress or strain in the material (col. 1, lines 24-27). The piezo elements may be formed from a thin film (col. 3,

lines 1-5 and col. 13, lines 39-40). Radziemski et al. even prefer a specific type of piezoelectric material (col. 5, lines 39-67). A structure, such as a plate, presses the piezomaterial to generate electrical signals (col. 4, lines 25-43). Radziemski et al. use piezomaterial. Piezomaterial is a traditional material used for ultrasound transducers, and is not a flexible membrane. Radziemski et al. do not disclose a flexible membrane adjacent a void.

Dvorsky discloses a diaphragm 22 of dead aluminum associated with a void or aperture 17 (col. 2, lines 49-64 and Figure 2). A separate piezo crystal 25 is provided. Dvorsky teach an old style microphone. The diaphragm 22 flexing over the void applies force to the piezo crystal 25 to generate electrical signal. As noted by the Examiner, both Radziemski et al. and Dvorsky provide piezoelectric acoustic transduction. Accordingly, Dvorsky does not suggest a flexible membrane adjacent a void with a conductor connected with the membrane. The membrane of Dvorsky applies mechanical force. Piezoelectric transduction operates differently than a capacitive membrane ultrasound transducer or flexible membrane with a connected conductor.

Independent claim 12 recites generating acoustic or electrical signals with variation between a first electrode on a membrane and a second electrode where the variation is flexing of the membrane. As discussed above, Radziemski et al. use piezoelectric transduction, relying on the piezo material properties to generate electricity in response to applied force. Radziemski et al. do not suggest generating acoustic or electrical signals with variation between two electrodes where variation is flexing of the membrane.

Independent claim 20 recites a capacitive membrane ultrasound transducer. Radziemski et al. rely on a different approach for transducing. A piezoelectric element is not a capacitive membrane transducer.

Additionally, Radziemski et al. use the piezoelectric transduction for electrical generation and storage for powering small scale electrical apparatuses (col. 1, lines 16-21). One example frequency of force application is once per second (col. 6, lines 16-17). Radziemski et al. do not suggest use at ultrasound frequencies, so do not disclose an ultrasound transducer.

Dependent claims 3, 4, 7 and 13-15 depend from claims 1 or 12, so are allowable for the same reasons as the corresponding independent claim. Further limitations distinguish from Radziemski et al. For example, claim 7 recites a switch operable to short two electrodes. The

Examiner cites to the diodes which may connect electrodes in an over voltage state. However, connection through the voltage step of the diode is not a short. The diode is also not a switch. As another example, claim 13 recites holding the voltage between electrodes substantially constant where the voltage may exceed a breakdown voltage of the membrane. Since Radziemski et al. use piezo material, there is no suggestion to hold a voltage relative to a membrane breakdown voltage.

Regarding claims 1, 2, 12 and 20, a person of ordinary skill in the art would not have used the microphone teachings of Dvorsky with the small electronics power generator of Radzeimski et al. Radzeimski et al. seeks to maximize the power generated, but Dvorsky desires sensitivity. Very different structures are used as well.

The Examiner rejected dependent claims 5, 6 and 16 pursuant to 35 U.S.C. § 103(a) as being upatentable over Radziemski et al. in view of Kim (U.S. Patent No. 5,859,758). A person of ordinary skill in the art would not have provided the diode and voltage source voltage limiting of claims 5, 6 and 16 based on the teachings of Radziemski et al. and Kim. Radziemski et al. teach piezoelectric transduction. Piezoelectric transducers for ultrasound typically do not include bias voltage sources, so a person of ordinary skill in the art would not have provided a bias voltage source and associated circuit as part of the voltage limiting circuit with the piezoelectric element of Radziemski et al.

The Examiner rejected dependent claims 9-11, 18 and 19 pursuant to 35 U.S.C. § 103(a) as being upatentable over Radziemski et al. in view of Wagner et al. (U.S. Patent No. 5,430,595). Wagner et al. disclose transistors and diodes in a semiconductor unrelated to the piezoelectric device of Radziemski et al. The piezoelectric is not a semiconductor substrate, so the teaching of Wagner et al. would not have been used with the device of Radziemski et al. Radziemski et al. also includes a return path 211, indicating the other circuits are remote from the piezoelectric element. For ultrasound transducers, the piezoelectric elements are typically meters away from associated electronics, such as the preamplifier. A person of ordinary skill in the art would not have positioned the voltage limiting circuit in the probe, but instead positioned

the circuit in the imaging system. The probe housings are small and heat dissipation is a problem.

The integration cited by the Examiner from the court decision is not being claimed. The circuit is a separate component than the housing. The housing for piezoelectric elements may not include any electronics. It would not have been obvious to include the voltage limiting circuit in the transducer housing rather than at the imaging system with other electronics.

The Examiner rejected dependent claim 21 pursuant to 35 U.S.C. § 103(a) as being upatentable over Radziemski et al. in view of Wagner et al. and Oppelt (U.S. Patent No. 6,074,346). The transducer of Oppelt, like Radziemski et al., is a piezoelectric based transducer, not a capacitive membrane ultrasound transducer.

Dependent claims 5, 6, 9-11, 16, 18, 19 and 21 depend from the independent claims discussed above, so are also allowable for the same reasons.

CONCLUSION:

Applicants respectfully submit that all of the pending claims are in condition for allowance and seeks early allowance thereof. If for any reason, the Examiner is unable to allow the application but believes that an interview would be helpful to resolve any issues, he is respectfully requested to call the undersigned at (650) 694-5810 or Craig Summerfield at (312) 321-4726.

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